(54) CMOS SOLID IMAGING DEVICE

 (57)Abstract:
PROBLEM TO BE SOLVED: To provide a CMOS solid imaging device which does not generate noise in the pixel column even if there is fluctuation in the output of a CDS (correlation double sampling) circuit.
SOLUTION: The imaging device comprises CDS circuits 5-7 connected in parallel for each of pixel columns n1-n3, switching means 8-10 for selectively switching the CDS circuits 5-7, a transferring circuit 11, a level determining circuit 12, and a selecting circuit 13. The transferring circuit 11 transfers an imaging signal outputted from the CDS circuits 5-7 selected by the switching means 8-10. The level determining circuit 12 compares an average level value of the CDS circuit output values obtained by passing the imaging signal for respective CDS circuits 5-7 connected in parallel for each of pixel columns n1-n3 with an imaging signal level outputted from the transferring circuit 11, and determines one out of the CDS circuits 5-7 for each of pixel columns n1-n3 so as to get the smallest level difference. The selecting circuit 13 outputs a selection signal, which selects the CDS

circuits 5-7 determined by the level determining circuit 12 for each of pixel columns n1-n3, to the switching means 8-10.

CLAIMS

[Claim(s)]
[Claim 1]
In the CMOS mold solid state image pickup device which outputs the image pick-up signal with which two or more arrangement is carried out, and reading appearance of the pixel train which has two or more image pick-up fields is carried out to juxtaposition from said two or more pixel trains of each,

Two or more CDS circuits which perform noise rejection of said image pick-up signal by which parallel connection was carried out for said every pixel train,

The switch means which switches said two or more CDS circuits selectively,

The transfer circuit which transmits said image pick-up signal outputted from the CDS circuit chosen by said switch means said whole pixel train,

The average level value of said all CDS circuit output values that were made to pass the image pick-up signal outputted to said image pick-up field from said image pick-up field when not irradiating image pick-up light for each [by which parallel connection was carried out for said every pixel train] CDS circuit of every, and were acquired is memorized. The level judging circuit which determines one that said average level value is compared with the image pick-up signal level transmitted from said transfer circuit, and the level difference will become the smallest for said every pixel train out of said two or more CDS circuits,

The selection circuitry which outputs the selection signal which chooses either of said CDS circuits which memorized said CDS circuit determined in said level judging circuit for said every pixel train, and were connected to said each pixel train to said switch means,

since -- the CMOS mold solid state image pickup device characterized by becoming.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]
Especially this invention relates to the CMOS mold image sensor which performs juxtaposition read-out of an image pick-up signal from the image pick-up read-out area divided into plurality with respect to a solid state image pickup device.
[0002]
[Description of the Prior Art]
It divides roughly into the conventional solid state image pickup device, and there are two, a CCD mold and a CMOS mold, in it. A CCD mold is a method which transmits directly the charge which generated light in the photodiode changed into a charge to the exterior by the charge coupled device (CCD:Charge Coupled Device).
On the other hand, a CMOS mold is taken out as potential with each amplifier for read-out in which the charge which generated light in the photodiode changed into a charge was prepared corresponding to each photodiode, and is outputted to the exterior.
[0003]
In the above-mentioned CCD mold, two or more high supply voltage for needing a special manufacture process and driving CCD is needed. on the other hand, a CMOS-IC manufacture process with the above-mentioned common MOS mold -- it can manufacture -- moreover -- simultaneous -- the CMOS-IC manufacture process same as circumference circuits, such as a clearance circuit of a reset noise, and various image-processing circuits, -- on chip -- since there is a merit which is not in the CCD mold that it is a low-power component by the ability to do and constitute only from a low single power supply in addition-izing, it is used especially increasingly in recent years.
[0004]
Two or more image pick-up fields where this CMOS mold solid state image pickup device has been arranged for two or more pixel trains of every, Two or more switches which switch said image pick-up signal amplified with two or more amplifier for read-out which amplifies said image pick-up signal, and said two or more amplifier for read-out, Two or more CDS (correlation duplex sampling) circuits which remove the

noise of said image pick-up signal which is connected with each switch of two or more of said switches, and is supplied through said two or more switches, the transfer circuit which carries out the level transfer of said image pick-up signal by which noise rejection was carried out in said two or more CDS circuits, and is outputted outside -- since -- it becomes.

[0005]

[Problem(s) to be Solved by the Invention]

However, in the CMOS mold, since variation was produced on the level of the image pick-up signal outputted by the property variation of the above mentioned CDS circuit from a pixel train, the problem of making a pixel train generate a pinstriped noise had been produced.

Then, this invention is made in order to solve ** or ******, and even if there is property variation of a CDS circuit, it aims at offering the CMOS mold solid state image pickup device which does not produce a noise in a pixel train.

[0006]

[Means for Solving the Problem]

In the CMOS mold solid state image pickup device with which the pixel train in which this invention has two or more image pick-up fields outputs the image pick-up signal by which two or more arrangement is carried out and reading appearance is carried out to juxtaposition from said two or more pixel trains of each Two or more CDS circuits which perform noise rejection of said image pick-up signal by which parallel connection was carried out for said every pixel train, The switch means which switches said two or more CDS circuits selectively, and the transfer circuit which transmits said image pick-up signal outputted from the CDS circuit chosen by said switch means said whole pixel train, The average level value of said all CDS circuit output values that were made to pass the image pick-up signal outputted to said image pick-up field from said image pick-up field when not irradiating image pick-up light for each [by which parallel connection was carried out for said every pixel train] CDS circuit of every, and were acquired is memorized. Said average level value is compared with the image pick-up signal level transmitted from said transfer circuit. The level judging circuit which determines one that the level difference will become the smallest for said every pixel train out of said two or more CDS circuits, the selection circuitry which outputs the selection signal which chooses either of said CDS circuits which memorized said CDS circuit determined in said level judging circuit for said every pixel train, and were connected to said each pixel train to said switch means -- since -- the CMOS mold solid state image pickup device characterized by becoming is offered.

[0007]

[Embodiment of the Invention]

Hereafter, the operation gestalt of this invention is explained using drawing 1 and drawing 2 .

Drawing 1 is the circuit block diagram showing the CMOS mold solid state image pickup device of the operation gestalt of this invention.

Drawing 2 is drawing showing the CDS circuit output value connected to each pixel train.

[0008]

As shown in drawing 1 , the CMOS mold solid state image pickup device 1 of the operation gestalt of this invention two or more pixel train n1- with two or more image pick-up fields 2 arranged for every n3, and two or more amplifier 3 for read-out which amplifies the image pick-up signal outputted from two or more image pick-up fields 2 While supplies said image pick-up signal amplified with two or more amplifier 3 for read-out, and it has other-end child 4b which outputs terminal 4a and said image pick-up signal. Two or more switches 4 arranged corresponding to each part of two or more image pick-up fields 2, parallel connection is carried out to other-end child 4b of two or more switches 4 -- having -- each pixel train n1- with the 1st [which removes the noise of said image pick-up signal outputted from the image pick-up field 2 arranged for every n3] thru/or 3rd CDS circuit 5, 6, and 7 The 1st thru/or the 3rd switch 8, 9, and 10 connected corresponding to each of the 1st thru/or 3rd CDS circuit 5, 6, and 7, The transfer circuit 11 which transmits said image pick-up signal which is outputted from the 1st thru/or 3rd CDS circuit 5, 6, and 7 in the pixel trains n1-n3, and by which noise rejection was carried out, The average level value of all the CDS circuit output values that the CDS circuits 5, 6, and 7 by which parallel connection was carried out to the pixel trains n1-n3 were made to pass the image pick-up signal outputted when not irradiating image pick-up light to the image pick-up field 2, and were acquired is memorized. This average level value is compared with each CDS circuits 5 and 6 transmitted from a transfer circuit 11 and the image pick-up signal level outputted for every seven. the level difference becomes the smallest -- as -- one out of the CDS circuits 5, 6, and 7 -- each pixel train n1- with the level judging circuit 12 determined for every n3 the CDS circuits 5, 6, and 7 determined in this level judging circuit 12 -- each pixel train n1- the selection circuitry 13 which outputs the signal which chooses either of the 1st [which memorized for every n3 and was connected to each pixel trains n1-n3] thru/or 3rd CDS circuit 5, 6, and 7 -- since -- it becomes.

[0009]

Next, drawing 2 is combined, used and explained about the actuation.

the following -- pixel train n1- the case where three CDS circuits 5, 6, and 7 are arranged for every n3 is explained.

After inputting into the 1st CDS circuit 5 the image pick-up signal outputted from the image pick-up field 2 through the amplifier 3 for reading, and a switch 4 in the condition of not irradiating image pick-up light, it transmits to a transfer circuit 9 through either the 1st thru/or the 3rd switch 8, 9, and 10.

And as shown in drawing 2 , each CDS circuits 5 and 6 where the above mentioned image pick-up signal was connected to the pixel trains n1-n3 in the level judging circuit 12, and the average level value which was passed for every seven and acquired are memorized. this average level value is compared with each CDS circuits 5 and 6 transmitted from the transfer circuit 11 and the image pick-up signal level outputted for every seven, and that level difference becomes the smallest -- as -- each pixel train n1- the combination of the CDS circuits 5, 6, and 7 is determined for every n3. The CDS circuit enclosed with O shows the best combination among drawing 2 , and, as for the dotted line, the average level value is shown. Then, the CDS circuits 5, 6, and 7 of each pixel trains n1-n3 determined in the level judging circuit 12 are memorized by the selection circuitry 13, and the signal which chooses either of the 1st [which was connected to each pixel trains n1-n3] thru/or 3rd CDS circuit 5, 6, and 7 is outputted. Thus, after choosing the 1st thru/or 3rd CDS circuit 5, 6, and 7, the image pick-up image which irradiates image pick-up light to the image pick-up field 2, and is not made to generate a noise in each pixel train is obtained.

[0010]

as mentioned above -- according to the operation gestalt of this invention -- two or more pixel train n1- with two or more image pick-up fields 2 arranged for every n3 Two or more amplifier 3 for read-out which amplifies the image pick-up signal outputted from two or more image pick-up fields 2, While supplies said image pick-up signal amplified with two or more amplifier 3 for read-out, and it has other-end child 4b which outputs terminal 4a and said image pick-up signal. Two or more switches 4 arranged corresponding to each part of two or more image pick-up fields 2, parallel connection is carried out to other-end child 4b of two or more switches 4 -- having -- each pixel train n1- with the 1st [which removes the noise of said image pick-up signal outputted from the image pick-up field 2 arranged for every n3] thru/or 3rd CDS circuit 5, 6, and 7 The 1st thru/or the 3rd switch 8, 9, and 10 connected corresponding to each of the 1st thru/or 3rd CDS circuit 5, 6, and 7, The transfer circuit 11 which transmits said image pick-up signal which is outputted from the 1st thru/or 3rd CDS circuit 5, 6, and 7 in the pixel

trains n1-n3, and by which noise rejection was carried out, The average level value of all the CDS circuit output values that the CDS circuits 5, 6, and 7 by which parallel connection was carried out to the pixel trains n1-n3 were made to pass the image pick-up signal outputted when not irradiating image pick-up light to the image pick-up field 2, and were acquired is memorized. This average level value is compared with each CDS circuits 5 and 6 transmitted from a transfer circuit 11 and the image pick-up signal level outputted for every seven. the level difference becomes the smallest -- as -- one out of the CDS circuits 5, 6, and 7 -- each pixel train n1- with the level judging circuit 12 determined for every n3 the CDS circuits 5, 6, and 7 determined in this level judging circuit 12 -- each pixel train n1- it memorizing for every n3 and with the selection circuitry 13 which outputs the signal which chooses either of the 1st [which was connected to each pixel trains n1-n3] thru/or 3rd CDS circuit 5, 6, and 7 since -- since it becomes, the CMOS mold solid state image pickup device 1 which does not produce a noise in a pixel train even if variation is in the output of a CDS circuit is obtained.

In addition, even when there is no amplifier 3 for read-out, the effectiveness of this invention is acquired.

[0011]

[Effect of the Invention]

As mentioned above, according to this invention, it sets to the CMOS mold solid state image pickup device which outputs the image pick-up signal with which two or more arrangement is carried out, and reading appearance of the pixel train which has two or more image pick-up fields is carried out to juxtaposition from said two or more pixel trains of each. Two or more CDS circuits which perform noise rejection of said image pick-up signal by which parallel connection was carried out for said every pixel train, The switch means which switches said two or more CDS circuits selectively, and the transfer circuit which transmits said image pick-up signal outputted from the CDS circuit chosen by said switch means said whole pixel train, The average level value of said all CDS circuit output values that were made to pass the image pick-up signal outputted to said image pick-up field from said image pick-up field when not irradiating image pick-up light for each [by which parallel connection was carried out for said every pixel train] CDS circuit of every, and were acquired is memorized. Said average level value is compared with the image pick-up signal level transmitted from said transfer circuit. The level judging circuit which determines one that the level difference will become the smallest for said every pixel train out of said two or more CDS circuits, the selection circuitry which outputs the selection signal which chooses either of said

CDS circuits which memorized said CDS circuit determined in said level judging circuit for said every pixel train, and were connected to said each pixel train to said switch means -- since, since it becomes The CMOS mold solid state image pickup device which does not produce a noise in a pixel train even if variation is in the output of a CDS circuit is obtained.

[Brief Description of the Drawings]

[Drawing 1] It is the circuit block diagram showing the CMOS mold solid state image pickup device of the operation gestalt of this invention.

[Drawing 2] It is drawing showing the CDS circuit output value connected to each pixel train.

[Description of Notations]

1 [-- A switch, 5 / -- The 1st CDS circuit, 6 / -- The 2nd CDS circuit, 7 / -- The 3rd CDS circuit, 8 / -- The 1st switch, 9 / -- The 2nd switch, 10 / -- The 3rd switch, 11 / -- A transfer circuit, 12 / -- A level judging circuit, 13 / -- A selection circuitry, n1, n2, n3 / -- Pixel train] -- A CMOS mold solid state image pickup device, 2 -- An image pick-up field, 3 -- The amplifier for read-out, 4

train.

[Description of Notations]

1 [-- A switch, 5 / -- The 1st CDS circuit, 6 / -- The 2nd CDS circuit, 7 / -- The 3rd CDS circuit, 8 / -- The 1st switch, 9 / -- The 2nd switch, 10 / -- The 3rd switch, 11 / -- A transfer circuit, 12 / -- A level judging circuit, 13 / -- A selection circuitry, n1, n2, n3 / -- Pixel train] -- A CMOS mold solid state image pickup device, 2 -- An image pick-up field, 3 -- The amplifier for read-out, 4